User's Manual

IC-25M SERIES

Digital Monochrome / Color 25Megapixel Camera with Camera Link Interface

REV 2.0

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1. Precautions

1-1. General

- Do not drop or damage the device
- Do not disassemble, repair or alter the device
- Keep the machine not to be stained with the alien substances
- Contact your nearest distributor in case of trouble or problem.

1-2. Precautions in Use

- Do not expose the camera' s image-pickup-plane to sunlight or other intense light directly. Its inner CMOS sensor might be damaged..
- In clearing, do not splash water on the device but wipe it out with smooth cloth or towel.
- Do not place magnets near the product.
- Be careful not to let liquid like water, drinks or chemicals leak inside the device.
- Clean the device often to remove dust on it.
- If the camera is not in use, attach the lens cap to the camera to protect the image Pickup surface.

1-3. Maintenance

Turn off power to the equipment and wipe it with a dry cloth.
If it becomes severely contaminated, gently wipe the affected areas with a soft Cloth dampened with diluted neutral detergent. Never use alcohol, benzene, thinner, or other chemicals because such chemicals may damage or discolor the paint and indications. If the image pickup surface becomes dusty, contaminated, or scratched, consult your sales representative.

2. Overview

IC-M25 is a mono area scan CMOS camera and IC-C25 is a color area scan CMOS camera. IC-x25 has 25 million pixels resolution.
These Cameras are suitable for a wide range of application within factory Automation, an also for application outside the factory floor, such as AOI(Automatic Optical Inspection), High-end surveillance and medical.

3. Specification

3.1 Electrical specification

- Imager : CMOS image Sensor
- Number of active pixels : 5056(H) x 5056(V)
- full resolution in continuous operation : 25 frames/second [Max(10Tap):30fps)]
- Pixel size : 4.5㎛ (H) × 4.5㎛ (V)
- Optical size : 35mm
- Scanning system : Progressive scan camera
- Responsivity : 18.16 DN/nJ/cm2 (550nm)
- ADC resolution : 8bit / 10bit / 12bit Bayer Pattern Output
- Pre-select and pulse width trigger modes
- S/N Ratio : > 42dB
- Dynamic Range : > 53dB
- Operating Temp : > 0℃ ~ +40℃
- Humidity : 20% ~ 90% RH(Non Condensing)
- Camera Link Configuration : 2Tap~10Tap Camera Link 2CH Full Mode
- Built in LUT (Look Up Table)
- Defective Correction Circuit built in
- Power supply voltage : DC12 V ± 10%(ripple 50 mV or less)
- LVAL-synchronous / A-synchronous operation (auto-detect)
- Setup by Windows XP / VISTA / 7 serial communication

3.2 Electrical shutter specification

■ Shutter Speed :

-. Shutter OFF or 1/1,000,000 to 10 sec

-. The exposure time at shutter OFF is different depending

-. on the reading mode.(Factory default : Shutter OFF)

■ Random Trigger Shutter ON / OFF switching (Factory default)

-. Fixed mode : The exposure time depends on the shutter speed setting

-. Pulse width mode : The exposure time depends on the pulse width.
Minimum pulse width : 1㎲sec(Minimum exposure time: 1㎲sec

3.3 Mechanical spec

■ Lens mount : F Mount (Option M42 Mount)

■ Dimensions : 82mm(L) * 82mm(W) * 65.6mm(H)

■ Weight : Approx 520g

■ Camera body grounding : Conductive between circuit GND and camera body

3.4 Input signal specification

■ TRIG : Camera Link I/F(CC1) and External Control connector input

-. Signal level : TTL level

-. Polarity : Positive/Negative switching (Factory default: Negative)

-. Pulse width : 1㎲sec or more

3.5 Operating ambient conditions

■ Performance assurance

-. Temperature : 0 to +40

-. Humidity : 20% ~ 90% RH(Non Condensing)

■ Operation guaranteed

-. Temperature : -5 to +50

-. Humidity : 10% to 90%(No dew formation)

■ Storage Temperature

-.Temperature : -20 to +60

-.Humidity : 90% or less (No dew formation)

3.6 Various safety standards

■ Performance assurance

-.CE(AoC)

Test Standard(2004/108/EC) : EN 55022 : 2006 +A1:2007 [Class A Equipment]
EN 55024 : 1998 +A1:2001, +A2:2003

-.FCC(Verification)

Test Standard : Section 15.107, Section 15.109 (Class A Equipment)

NOTE : This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

3.7 Sensor Information

3.7.1 Spectral response Mono

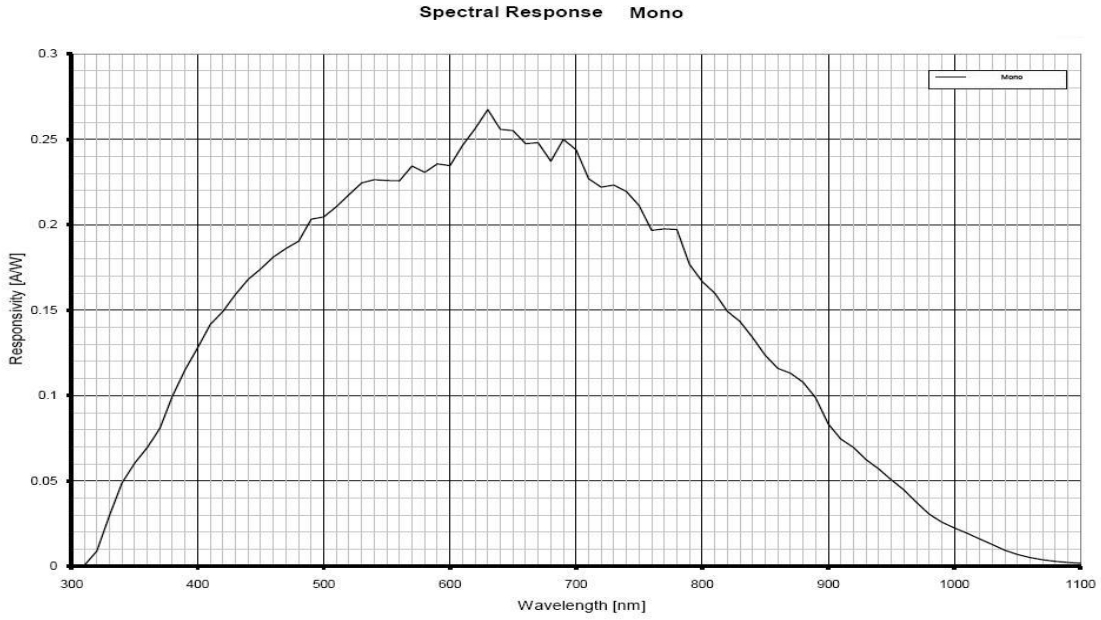


Fig 3.1 Spectral response

3.7.2 Spectral response Color

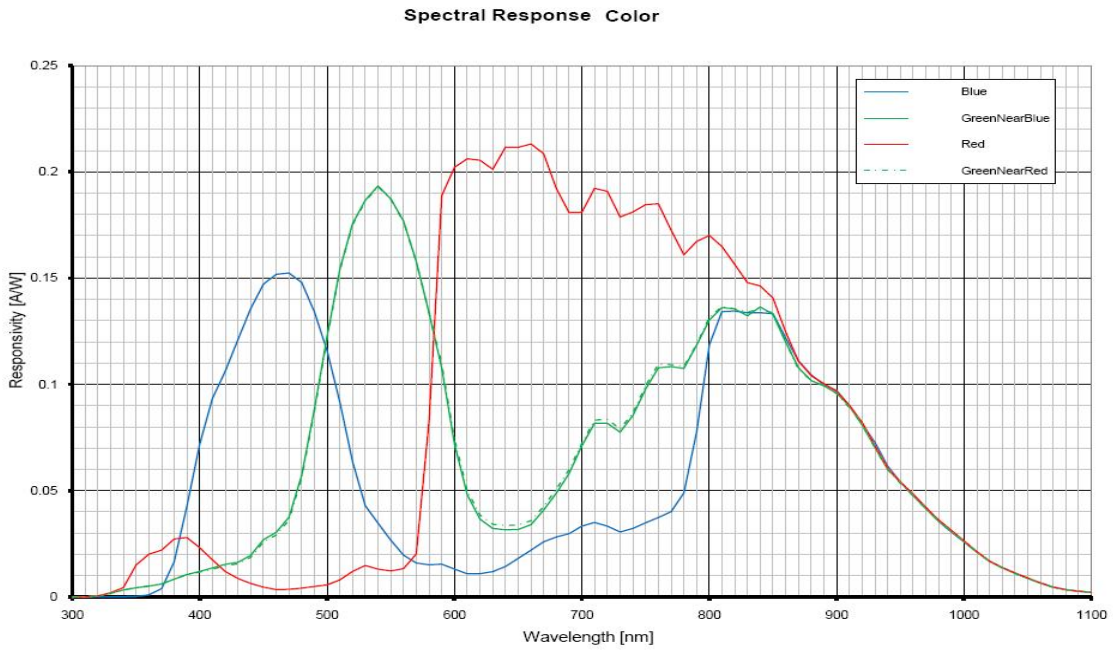


Fig 3.2 Spectral response

4. Camera Interface

4.1 General Description

As shown in the following figure, 4 types of connectors and status indicator LED are located on the back of the camera and have the functions as follows :

(1) 6 pin Power Input

▷ Camera Power Input(DC-12V/1A)

(2) 4 pin Control Connector

▷External Trigger Signal Input(1ch) and Strobe Output(1ch)

(3) 26 pin Camera-Link Connector

▷ Video Data Transmission, Camera Control

(4) Status LED

▷ Power and Operation Mode Display

-. Continuous ON Status :– camera operates in Continuous Mode

-. Flashing at 0.5 second intervals : camera operates in Trigger Master Mode.

-. Flashing at 0.25 second intervals : camera operates in Trigger Slaver Mode.

-. Flashing at 0.125 second intervals : camera operates in Free Run Mode.

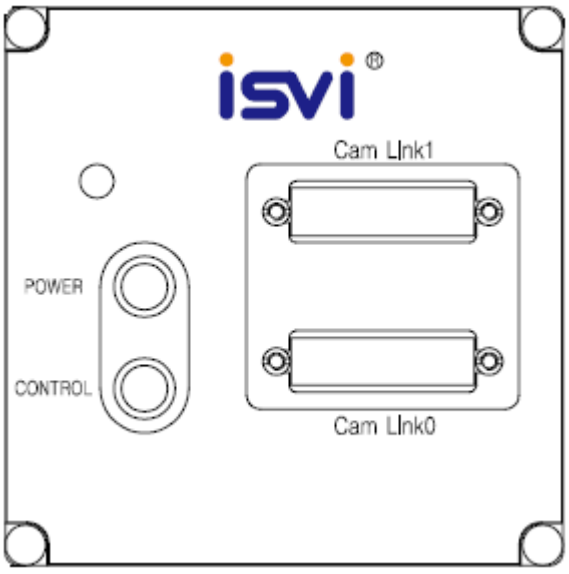


Fig 4.1 IC-25M SERIES CONNECTOR

4.2 Camera Link Connector

(1) Video output/controlling (Camera Link Full Configuration) CAMERA LINK0, LINK1

▷ Connector type: MDR 26-PIN connector 10226-52A2PL (Manufactured by 3M)

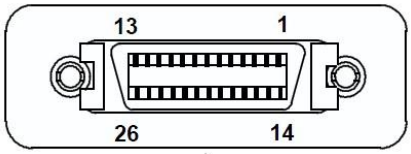


Fig 4.2 Camera Link0 Connector

Pin No	I/O	Signal Name	Pin No	I/O	Signal Name
1	Ground	Inner shield	14	Ground	Inner shield
2	OUT	X0-	15	OUT	X0+
3	OUT	X1-	16	OUT	X1+
4	OUT	X2-	17	OUT	X2+
5	OUT	XCLKOUT-	18	OUT	XCLKOUT+
6	OUT	X3-	19	OUT	X3+
7	INPUT	RX+_SERTC+	20	INPUT	RX-_SERTC-
8	OUT	TX-_SERTFG-	21	OUT	TX+_SERTFG+
9	INPUT	CC1-(Trigger-)	22	INPUT	CC1+(Trigger+)
10	INPUT	CC2+	23	INPUT	CC2-
11	INPUT	CC3-	24	INPUT	CC3+
12	INPUT	CC4+	25	INPUT	CC4-
13	Ground	Inner shield	26	Ground	Inner shield

Fig 4.3 Camera Link1 Pin Assignments

▷ Camera output complies with Camera Link Standard and following list shows the pin configuration of connector.

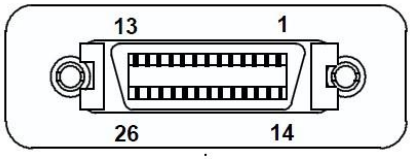


Fig 4.4 Camera Link1 Connector

Pin No	I/O	Signal Name	Pin No	I/O	Signal Name
1	Ground	Inner shield	14	Ground	Inner shield
2	OUT	Y0-	15	OUT	Y0+
3	OUT	Y1-	16	OUT	Y1+
4	OUT	Y2-	17	OUT	Y2+
5	OUT	YCLKOUT-	18	OUT	YCLKOUT+
6	OUT	Y3-	19	OUT	Y3+
7		Not Used	20		Not Used
8	OUT	Z0-	21	OUT	Z0+
9	INPUT	Z1-	22	INPUT	Z1+
10	INPUT	Z2-	23	INPUT	Z2+
11	INPUT	ZCLKOUT-	24	INPUT	ZCLKOUT+
12	INPUT	Z3-	25	INPUT	Z3+
13	Ground	Inner shield	26	Ground	Inner shield

Fig 4.5 Camera Link2 Pin Assignments

(2) Connector Connection Per Camera Link Output Format

▷Base

2tap(8bit /10bit /12bit) : Camera link1 connector

▷Medium

4tap(8bit /10bit /12bit) : Camera link1 connector & Camera link2 connector

▷Full

8tap(8bit /10bit) : Camera link1 connector & Camera link2 connector

10tap(8bit) : Camera link1 connector & Camera link2 connector

If Camera Link output is set to 2Tap's (Base) in IC-25M series, transmission and reception of all data are carried out through Camera Link connector 1 and it is not require to connect the cable to Connector 2.

4.3 Camera Link Interface

The video output is Camera Link, where the 8 channels with 8bit video are placed in a base configuration. The digital output signals follow Camera Link standardized

multiplexed signal output interface.
The output driver is NS type DS90CR287, and the receiver is NS type DS90CR288. The data bits from the digital video, FVAL, LVAL and DVAL are multiplexed into the twisted pairs, which are a part of the Camera Link. Trigger signals and the serial camera control are feed directly through its own pairs.
The 26 pin connector pin assignment follows the Camera Link base configuration.
For a detailed description of Camera Link specifications, please refer to the Camera Link standard specifications found on http://www.machinevisiononline.org

4.4 Power Input Connector

Power input connector of camera is Hirose 6 pin connector(part # HR10A-7R-6PB).
Pin arrangement and configuration are as follows:

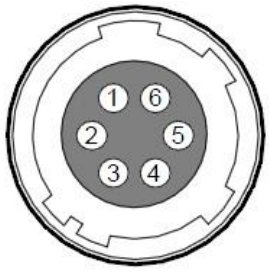


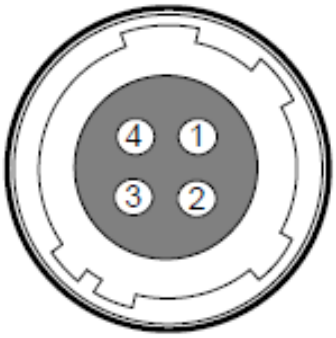
Fig 4.6 Power Input Connector

Pin No	I/O	Signal Name
1	INPUT	+12V
2	INPUT	+12V
3	INPUT	+12V
4	GND	GROUND
5	GND	GROUND
6	GND	GROUND

Power plug can be configured using the Hirose 6 pin plug (part # HR10A-7R-6P) or compatible parts enclosed in the camera box. For power supply, it is recommended to use the power adaptor with over 1A current output at 12VDC ±10% voltage output.

4.5 Control Connector

The control connector used is Hirose 4 pin connector(part # HR10A-7R-4S) and consists of external trigger signal input and strobe output port.
Pin arrangement and configuration are as follows:



Pin No	I/O	Signal Name
1	INPUT	Trigger +
2	INPUT	Trigger -
3	GND	GROUND
4	OUTPUT	Strobe Output

Fig 4.7 Control Connector

4.6 Trigger Input Circuit

Following figure shows trigger signal input circuit of 4 pin connector. Trigger signal entered is delivered to internal circuit through photo coupler. Minimum trigger width that can be recognized at camera is 5μs. If trigger signal entered is less than 5μs, trigger signal is ignored in camera. External trigger signal can approve signals to the circuits in the 2 methods shown below.

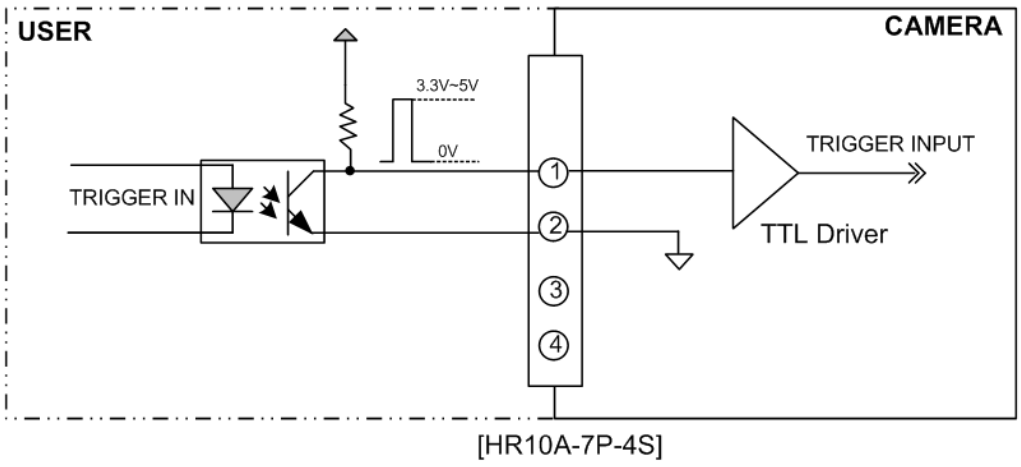


Fig 4.4 Trigger Input Schematic

4.7 Strobe Output Circuit

Strobe output signal is output through TTL Driver IC of 3.3 V output level and pulse width of signal is output in synchronization with exposure of camera.

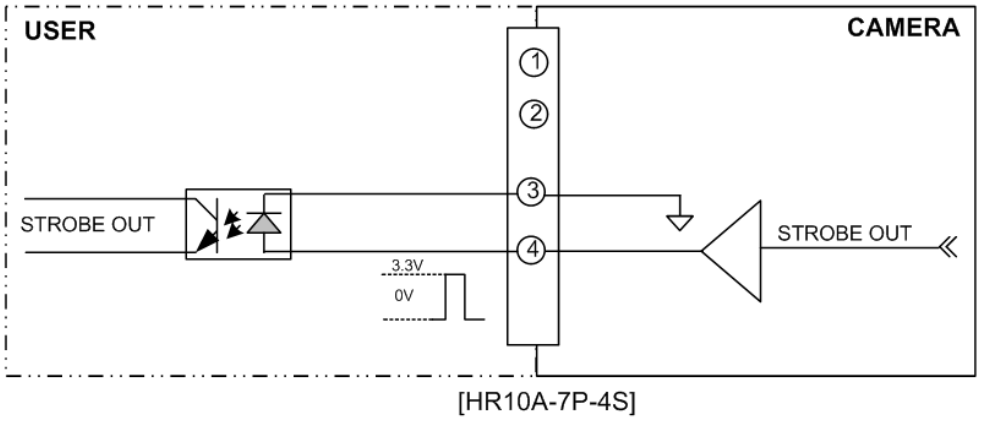


Fig 4.5 Strobe Output Schematic

5. Functions and Operations

5.1 Basic Functions

The IC-25M cameras is a progressive scan camera with 25 Mega pixels monochrome or Bayer mosaic color CMOS. The interface to the host PC is via digital Camera Link. Both models output video as 8bits. The color version IC-25M outputs raw Bayer video, requiring host based color interpolation. The camera also features several pre-processing functions. There are 2 trigger modes in addition to continuous operation. The Pre-Select and Pulse Width trigger modes are available with a unique Automatic LVAL sync or a-sync selection function. Below the functions are described in detail below.

5.1.1 Control of the Electromechanical Shutter

Fig 5-1 shows two different ways in which a shutter can be controlled during the global reset sequence. In both cases, the maximum integration time is set by the difference between global_read_start and global_rst_end. In shutter example 1, the shutter is open during the initial ERS sequence and during the row reset phase. The shutter closes during the integration phase. The pixel array is integrating incident light from the start of the integration phase to the point at which the shutter closes. Finally, the shutter opens again after the end of the readout phase. In shutter example 2, the shutter is open during the initial ERS sequence and closes sometime during the row reset phase. The shutter both opens and closes during the

integration phase. The pixel array is integrating incident light for the part of the

integration phase during which the shutter is open. As for the previous example, the shutter opens again after the end of the readout phase.

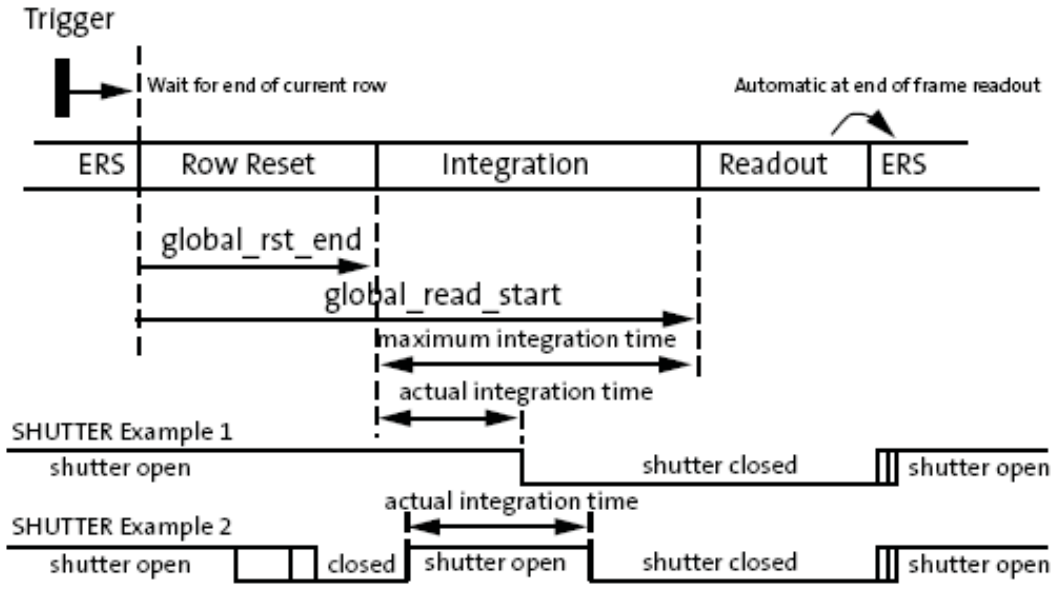


Fig. 5-1 Control of the Electromechanical Shutter

It is essential that the shutter remains closed during the entire row readout phase (that is, until FV has de-asserted for the frame readout); otherwise, some rows of data will be corrupted (over-integrated).It is essential that the shutter closes before the end of the integration phase. If the row readout phase is allowed to start before the shutter closes, each row in turn will be integrated for one row-time longer than the previous row. After FV de-asserts to signal the completion of the readout phase, there is a time delay of approximately *10 * line_length_pck* before the sensor starts to integrate light-sensitive rows for the next ERS frame. It is essential that the shutter be opened at some point in this time window; otherwise, the first ERS frame will not be uniformly integrated.

global_read_start > global_shutter_start

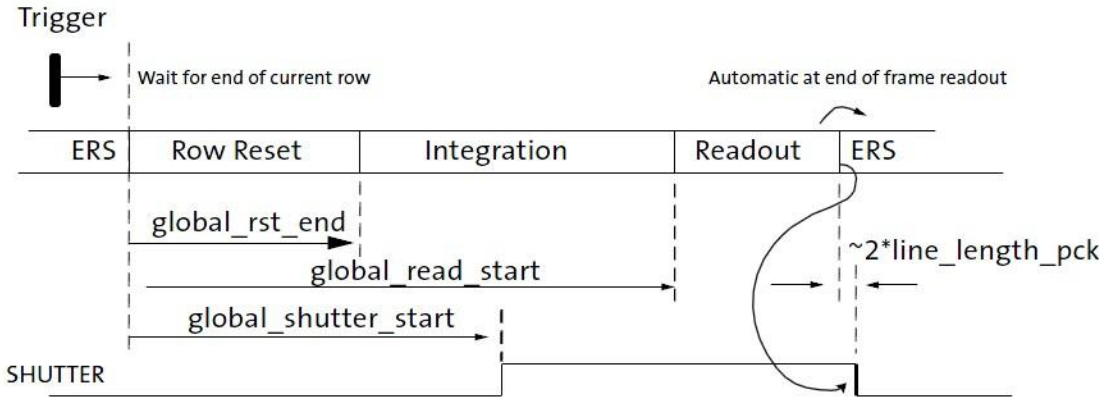


Fig. 5-2 Controlling the SHUTTER Output

5.2 Trigger operation

Trigger mode of camera is divided into Free-Run mode where image is synchronized to Internal Trigger signal created inside camera, and External Sync mode where image is synchronized to the trigger signal entered in external port.

5.1.2 Free Run Mode

In Free Run mode, the cycle of internal trigger signal is determined by Transfer Time (1 Frame data transmission time) and Exposure setting value, and image is obtained with such periodic signal. Cycle of internal signal, that is, Frame Rate, is determined with the following 2 conditions.

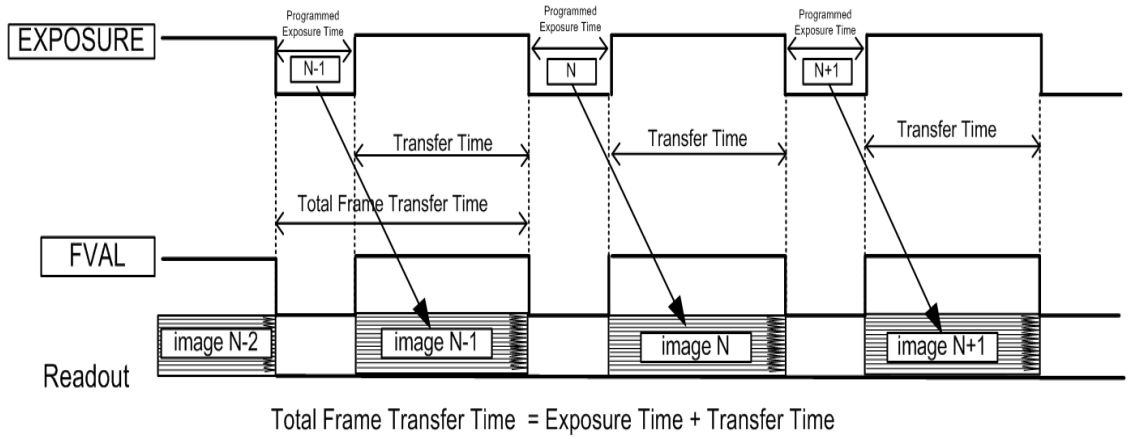


Fig. 5-3 Free Run Mode Readout Time

5.1.3 External Sync Mode

In External Sync Mode, camera keeps standby status until trigger signal is entered and performs image transmission (Frame Transfer) after exposure process if trigger input occurs as shown in Fig. 7.4. To operate camera in External Sync mode, it is required to set Trigger Source regarding which input, CC1 input port or External Trigger port, will be used for trigger signal, as well as Polarity and Exposure source of signal entered.

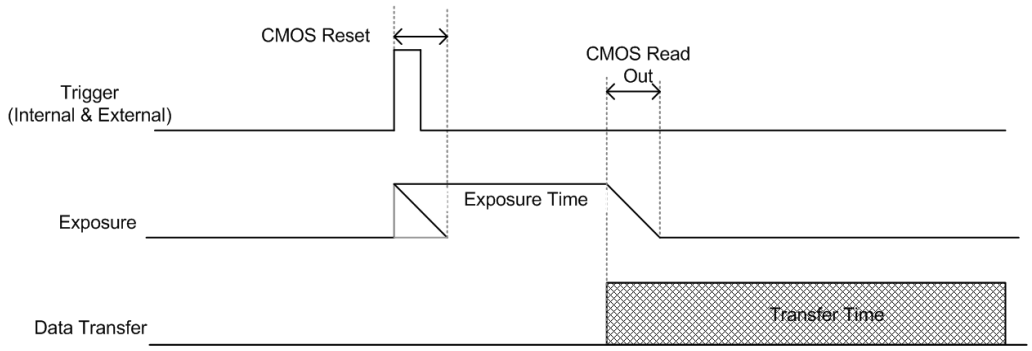


Fig. 5-4 External Sync Mode

▷ Trigger Source : select either of CC1 and External Connector as source of external trigger input signals.

▷Trigger Polarity : set whether polarity of Trigger signal entered is Active High or Active Low.

▷ Exposure Source : select to synchronize exposure time with pulse width of trigger input signal or with exposure time programmed inside the camera.

5.1.4 Overlap trigger input

When trigger input occurs in the course of Frame Transfer and Fig. 7.5, it simultaneously performs exposure of next image for new trigger input. In this case, image shooting is possible up to the speed of 1/Transfer Time(sec), the maximum Frame Rate conditions regardless of exposure time.

▷ When the trigger signal with cycle faster than maximum Frame Rate conditions, next Frame Transfer is performed while one Frame Transfer is not completed, failing to obtain overall image.

▷ When new trigger input occurs in Exposure section while Exposure Source is set in Program, the signal is ignored. It is the case that exposure setting value is set longer than trigger input cycle, and since it is not synchronized for all trigger signal entered in camera, Frame Rate gets slower than Trigger input cycle.

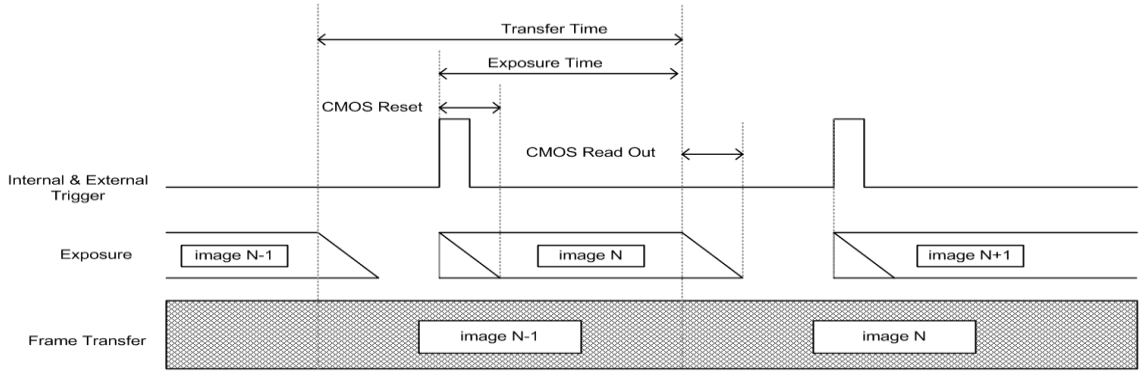


Fig. 5-5 Overlap Trigger

5.4 LUT(Look Up Table)

LUT (Lookup Table) enables the conversion of the original image value into an ad-hoc level value. Since one-on-one mapping is performed for each level value, you can connect the ad-hoc 8/10-bit input to the ad-hoc 8/10-bit output.

LUT has a programmable look-up table (LUT) that lets the user adjust the transfer function of the video output. Selectable settings include multiple-point LUT and Gamma 0.5. The look up table has 1024 setting points by which the full range of input signal is divided. On each of the point, the gain can be set to get a required transfer function. Gamma 0.45 or programmable LUT can be selected by software control. If the LUT is not configured, Gamma is set at 1.0(off)

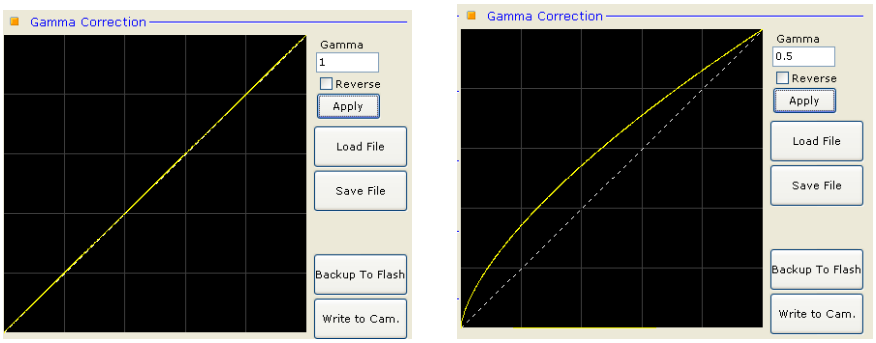


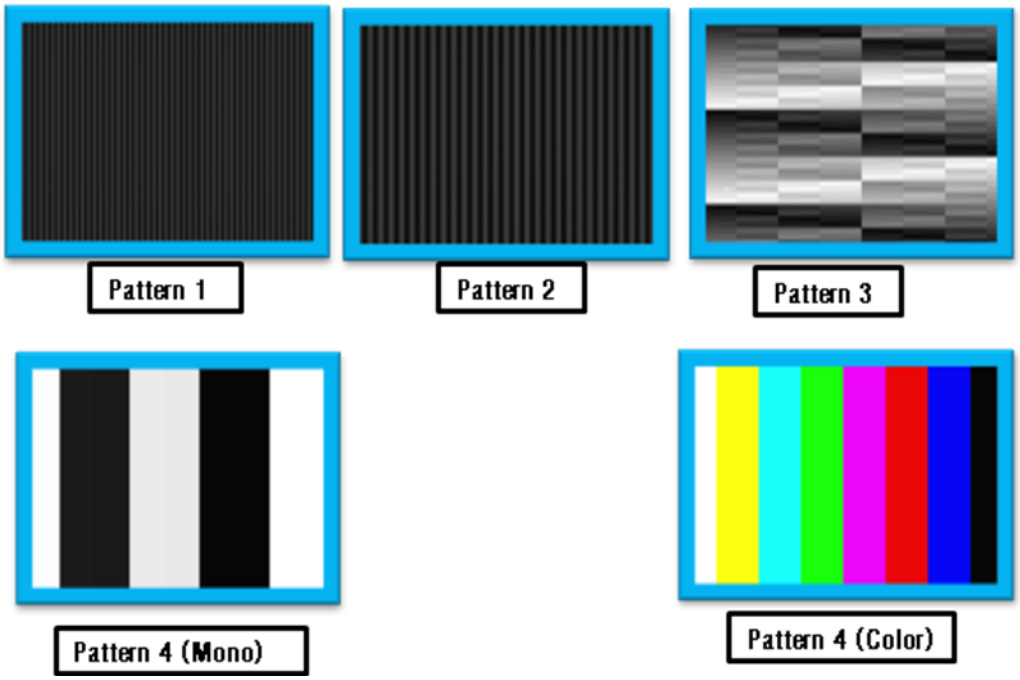
Fig. 5-7 Gamma Correction

5.5 Defective Correction Circuits

There could be incidence of light-malfunctioning defective pixel in the CMOS. In this case, additional correction is required to enhance the degraded quality of output images. For each camera, defective pixel information of CMOS is encoded during the shipping process. If a user demands an addition of defective pixel information, a new coordinate of defective pixel must be entered into the camera.

5.6 Test Pattern Image

It can be set to output test image created inside instead of image data output from image sensor, in order to check normal operation of camera. 4 types of test image are available



6. External Appearance and Dimensions

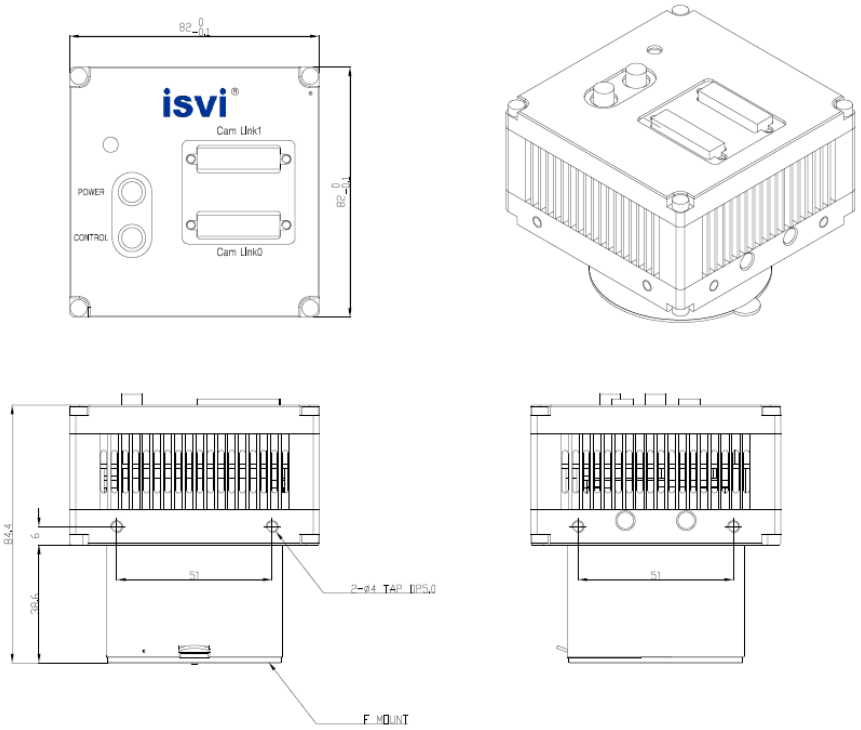


Fig. 7-1 Fmount Dimension

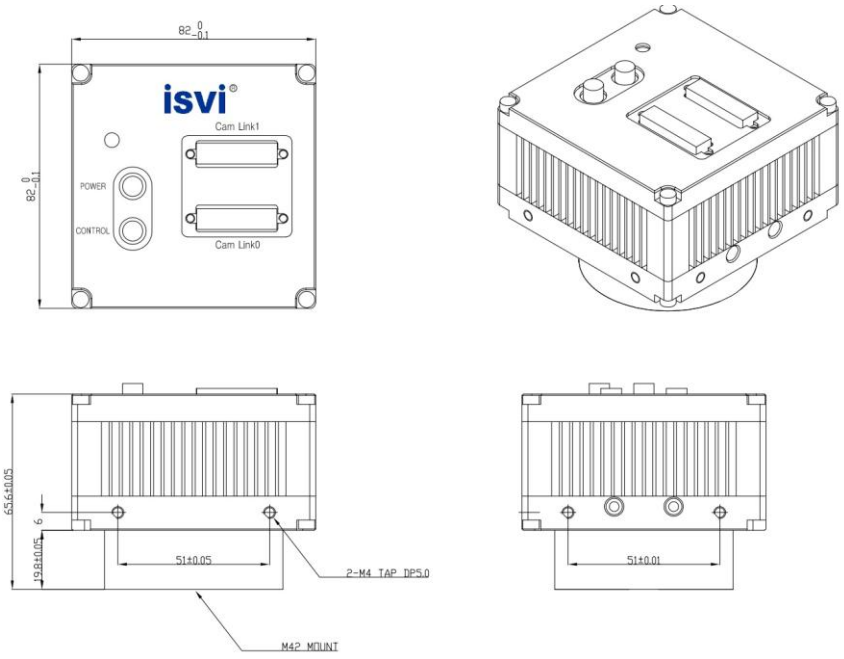


Fig. 7-2 m42 mount Dimension

7. Communication specification

All configuration of the 25M series camera is done via Camera Link.
All types of camera setting commands, requiring data transmission are delivered in Hex command type. The camera can be set up from a PC running terminal emulator software, or using iSVi camera control software.(CamIsv)

7.1 Communication Setting:

- Baud Rate : 9,600 bps
- Data Length : 8 bit
- Start Bit : 1 bit
- Stop bit : 1 bit
- Parity : None
- Handshake: None
-

7.1.1 Write Command Packet Format

▷<STX> <Write> <High_Add><Low_Add> <Data1> <Data2> <Data3> <Data4> <Etx>
<0x02> <0x10> <0xXX> <0xXX > <0xXX> <0xXX> <0xXX> <0xXX> <0x03>

7.1.2 Read Command Packet Format

▷ <STX> <Read> <High_Add> <Low_Add> <Etx>
<0x02> <0x20> <0xXX> <0xXX> <0x03>

7.1.3 Read Command Return Packet Format

▷ <STX> <Write> <High_Add> <Low_Add> <Data1> <Data2> <Data3> <Data4> <Etx>
<0x02> <0x20> <0xXX> <0xXX > <0xXX> <0xXX> <0xXX> <0xXX> <0x03>

7.2 Command List

7.2.1 Camera Link Out Format [0210003d0000000X03]

Base 2Taps 8Bit : 0X = 07
Base 2Taps 10Bit : 0X = 0A
Base 2Taps 12Bit : 0X = 0C
Medium 4Taps 8Bit : 0X = 01
Medium 4Taps 10Bit : 0X = 03

Medium 4Taps 12Bit : 0X = 05
Full 8Taps 8Bit : 0X = 00
Full 10Taps 8Bit : 0X = 0F

7.2.2 Camera Mode Format [0210004100000XXX03]

▷ Continuous Mode

Live Normal Mode : 0XXX = 0601
Live Binging Mode : 0XXX = 0701
Live Subsampling Mode : 0XXX = 0681
Free Run Normal Mode : 0XXX = 0611 & [021000030000001003]
Free Run Binging Mode : 0XXX = 0711 & [021000030000001003]
Free Run Subsampling Mode : 0XXX = 0691 & [021000030000001003]

▷ Trigger Mode

Trig Master Normal Mode : 0XXX = 0611 & [021000030000000403]
Trig Master Binging Mode : 0XXX = 0711 & [021000030000000403]
Trig Master Subsampling Mode : 0XXX = 0691 & [021000030000000403]
Trig Slave Normal Mode : 0XXX = 0631
Trig Slave Binging Mode : 0XXX = 0731
Trig Slave Subsampling Mode : 0XXX = 06B1

7.2.3 Trigger Polarity & Source Format [02100003000000XX03]

▷ Trigger Master Mode

Polarity Low & source Internal(cc1) : XX = 00
Polarity high & source Internal(cc1) : XX = 02
Polarity Low & source External : XX = 01
Polarity high & source External : XX = 03

▷ Trigger Slave Mode

Polarity Low & source Internal(cc1) : XX = 08
Polarity high & source Internal(cc1) : XX = 0A
Polarity Low & source External : XX = 09
Polarity high & source External : XX = 0B

7.2.4 Exposure Time Format [021000430000XXXX03] & [021000440000XXXX03]

1usec : XXXX = 001B & XXXX = 0001 (Minimum Value)
1msec : XXXX = 6978 & XXXX = 0001

10msec : XXXX = 0207 & XXXX = 0208
100msec : XXXX = 066B & XXXX = 066B
1sec : XXXX = 144C & XXXX = 144C
10sec : XXXX = 402F & XXXX = 04030 (Maximum Value)

7.2.5 Gain Value Format [021000460000XXXX03] & [0210004B0000XXXX03]

Level 1 : XXXX = 09E5 & XXXX = 00080 (Normal Value)
Level 2 : XXXX = 09E5 & XXXX = 0081
Level 3 : XXXX = 09E5 & XXXX = 0083
Level 4 : XXXX = 09E5 & XXXX = 0086
Level 5 : XXXX = 09E5 & XXXX = 0087
.
.
.
.
Level 251 : XXXX = 06D1 & XXXX = 000A9
Level 252 : XXXX = 06D1 & XXXX = 00AB
Level 253 : XXXX = 06D1 & XXXX = 00AE
Level 254 : XXXX = 06D1 & XXXX = 00B0
Level 255 : XXXX = 0CD1 & XXXX = 0080 (Maximum Value)

7.2.6 Black Level Value Format [0210004A0000XXXX03]

Level 1 : XXXX = 4500
Level 2 : XXXX = 4501
Level 3 : XXXX = 4502
Level 4 : XXXX = 4503
Level 5 : XXXX = 4504
.
.
.

Level 251 : XXXX = 45FB
Level 252 : XXXX = 45FC
Level 253 : XXXX = 45FD
Level 254 : XXXX = 45FE
Level 255 : XXXX = 45FF (Maximum Value)

7.2.7 White Balance Format [02100006000000XX03]

Enable White balance : XX=00
Disable White balance : XX=01
Bayer Select : XX=06 (RG Select) (Ext :BG(XX)=00, GB(XX)=02, GB(XX)=04
Manual Gain Control
Red Gain [021000070000XXXX03] : XXXX = 0000~07FF (0~2047)
Green Gain [021000080000XXXX03] : XXXX = 0000~07FF (0~2047)
Blue Gain [021000090000XXXX03] : XXXX = 0000~07FF (0~2047)

7.2.8 Current Temperature Read Format [022000B903]

0℃: 022000B90000230003
1℃: 022000B90000230003
2℃: 022000B90000230003
3℃: 022000B90000230003
4℃: 022000B90000230003
.
.
.
66℃: 022000B90000550003
67℃: 022000B90000560003
68℃: 022000B90000570003
69℃: 022000B90000580003
70℃: 022000B90000590003

7.2.9 Test Pattern Format [021000D2000000XX03]

OFF(Normal) : XX = 00

Pattern 1 : XX = 04

Pattern 2 : XX = 05

Pattern 3 : XX = 06

Pattern 4 : XX = 07

8. Camera Control Tool (GUI)

8.1 camera & frame grabber Connect

Camera configuration utility software, the camISV, is provided with change its settings and save the settings a file or in the camera. The configuration utility includes an interactive help file, which will guide you through the camera settings. When you execute the program while the camera is turned on, Camera Scan window appears as shown in Fig 8-1.

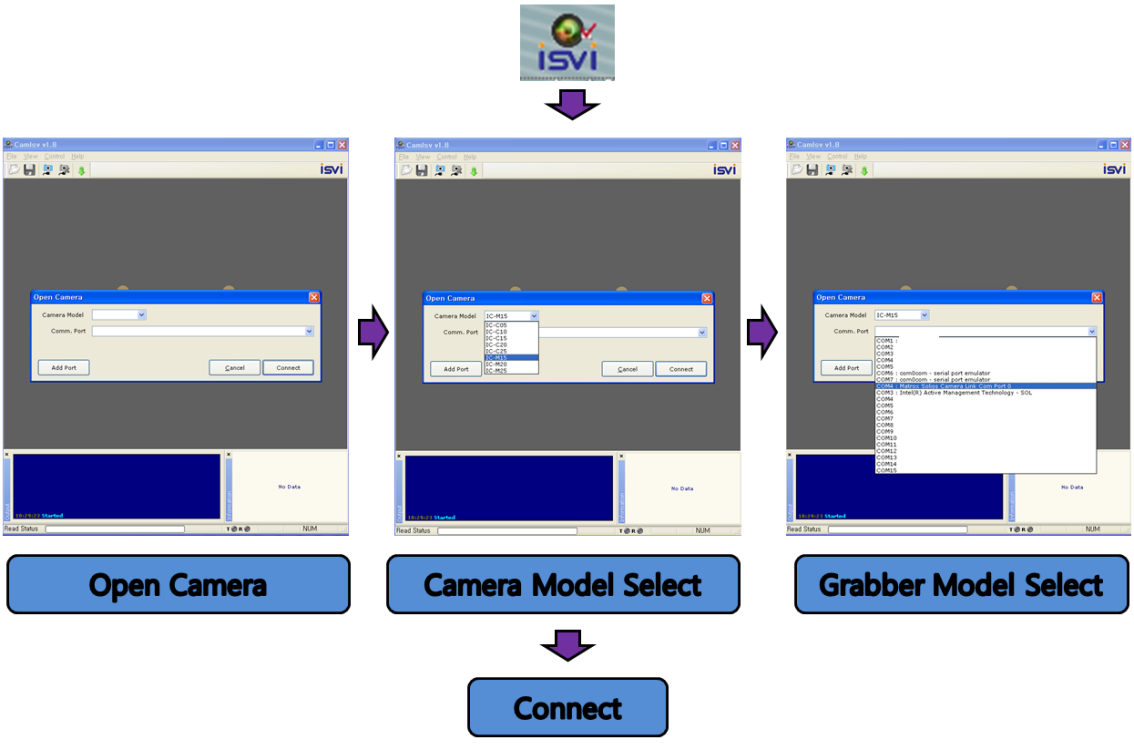


Fig. 8-1 CamIsv Connect

8.2 Main Windows Control

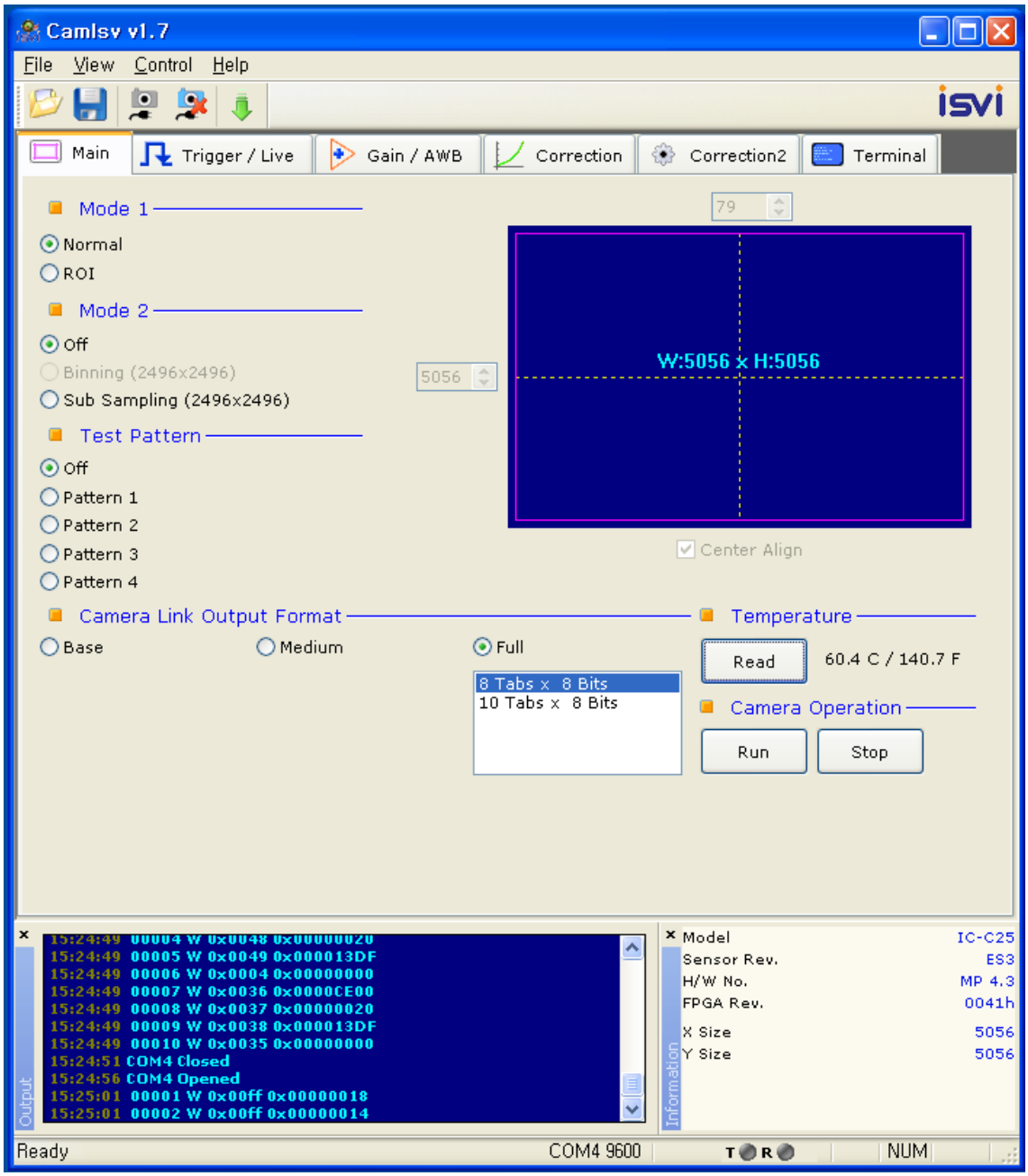


Fig. 8-2 Main Windows

■ Output

It's available to check the connection between Grabber and Camera through the Terminal screen displayed command code from PC to Camera.

■ Information

▶ Model : Camera Model Display

▶ Sensor Rev. : Sensor Version Display

▶ H/W No : Camera PBA Version Display

▶ H/W No : Camera FPGA Firmware Version Display

▶ X size : Camera X Axis Full Resolution (5056)

▶ Y size : Camera Y Axis Full Resolution (5056)

■ Mode 1

▶ Normal : Current Mode

▶ ROI : It will be used when user want to set customized resolution

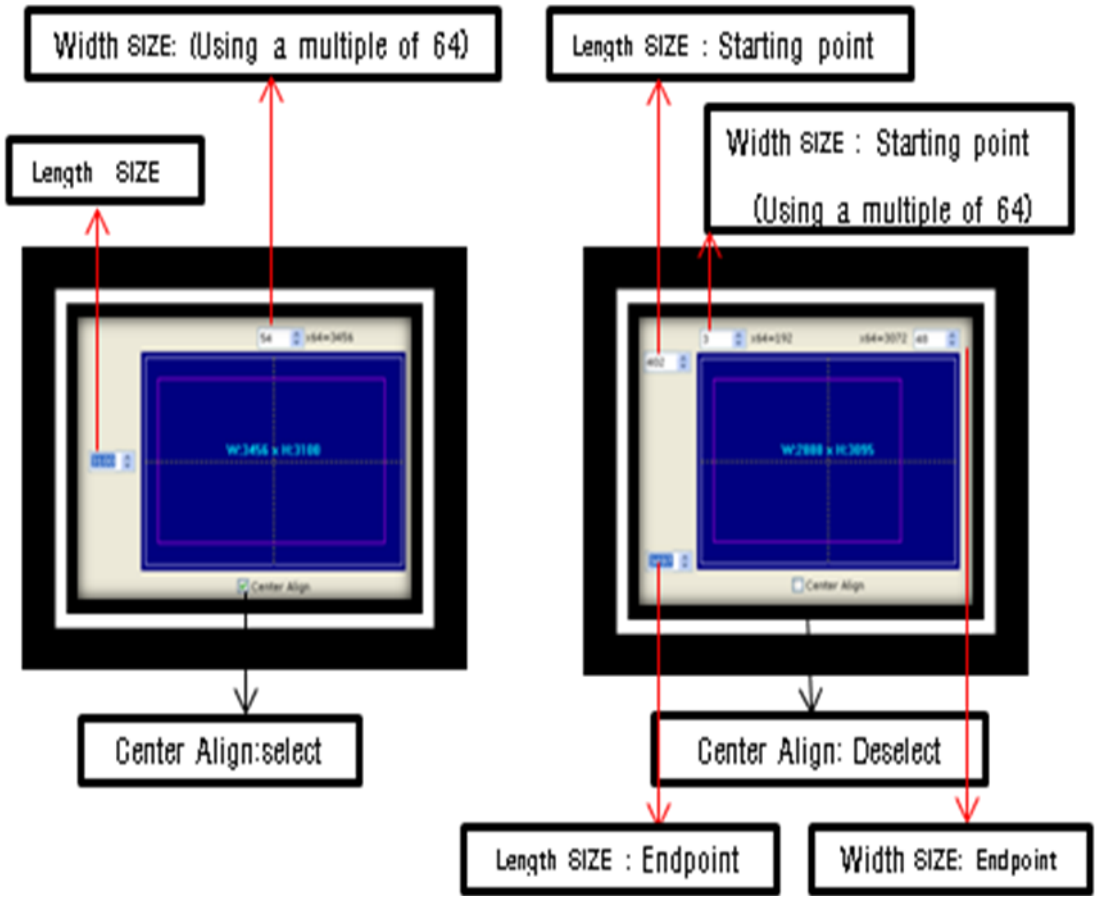

Width SIZE: (Using a multiple of 64)
Length SIZE
Center Align:select
Length SIZE : Starting point
Width SIZE : Starting point
(Using a multiple of 64)
Center Align: Deselect
Length SIZE : Endpoint
Width SIZE: Endpoint

Fig. 8-3 ROI Windows

■ Mode 2

▶ Off : No Binning & Sub Sampling

▶ Binning(2496*2496): Sensor output to 2x2 Binning. (color camera not acceptable)

▶ Sub Sampling(2496*2496) : Sensor output to 2x2 Sub Sampling mode

■ Test Pattern

▶ Off : Test Pattern Off (Normal Mode)

▶ Pattern 1

▶ Pattern 2

▶ Pattern 3

▶ Pattern 4

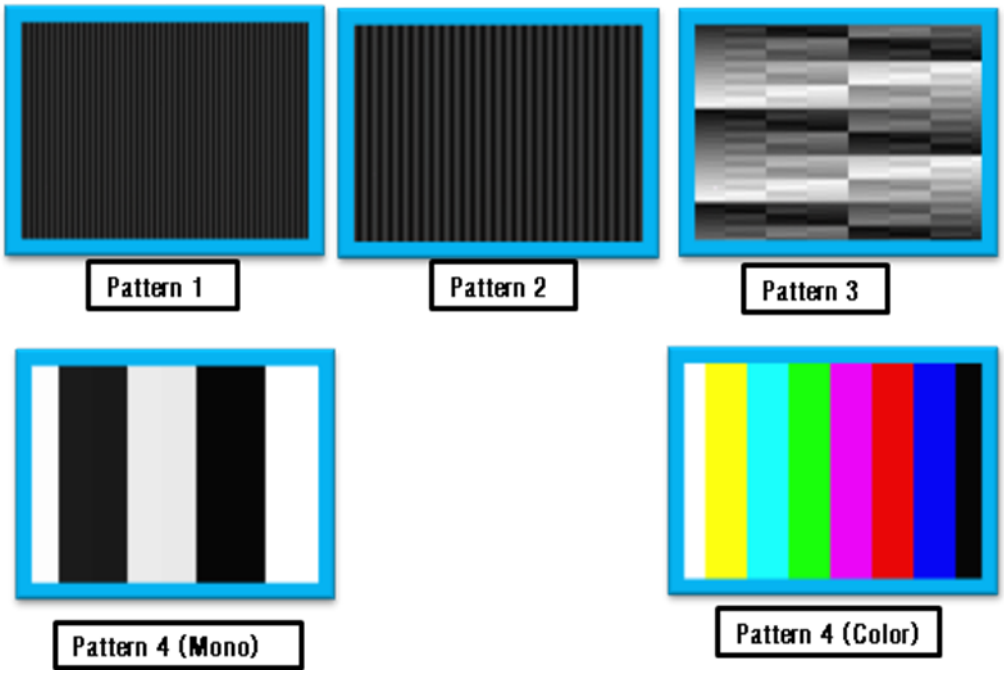


Fig. 8-4 Test Pattern

■ Camera Link Output Format

Fig. 8-5 CamIsv Connect

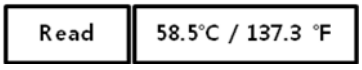
▶ Base : A, B_Two Port Output

▶ Medium : A, B, C, D_Four Port Output

▶ Full _8Tap : A, B, C, D, E, F, G, H_Eight Port Output

▶ Full _10Tap : A, B, C, D, E, F, G, H ,I ,J_Ten Port Output

■ Temperature



▶ Read : Read Current temperature of Sensor [ºC / ºF]

■ Camera Operation-

▶ Run : Run Sensor

▶ Stop : Stop Sensor

8.3 Trigger / Live Windows Control

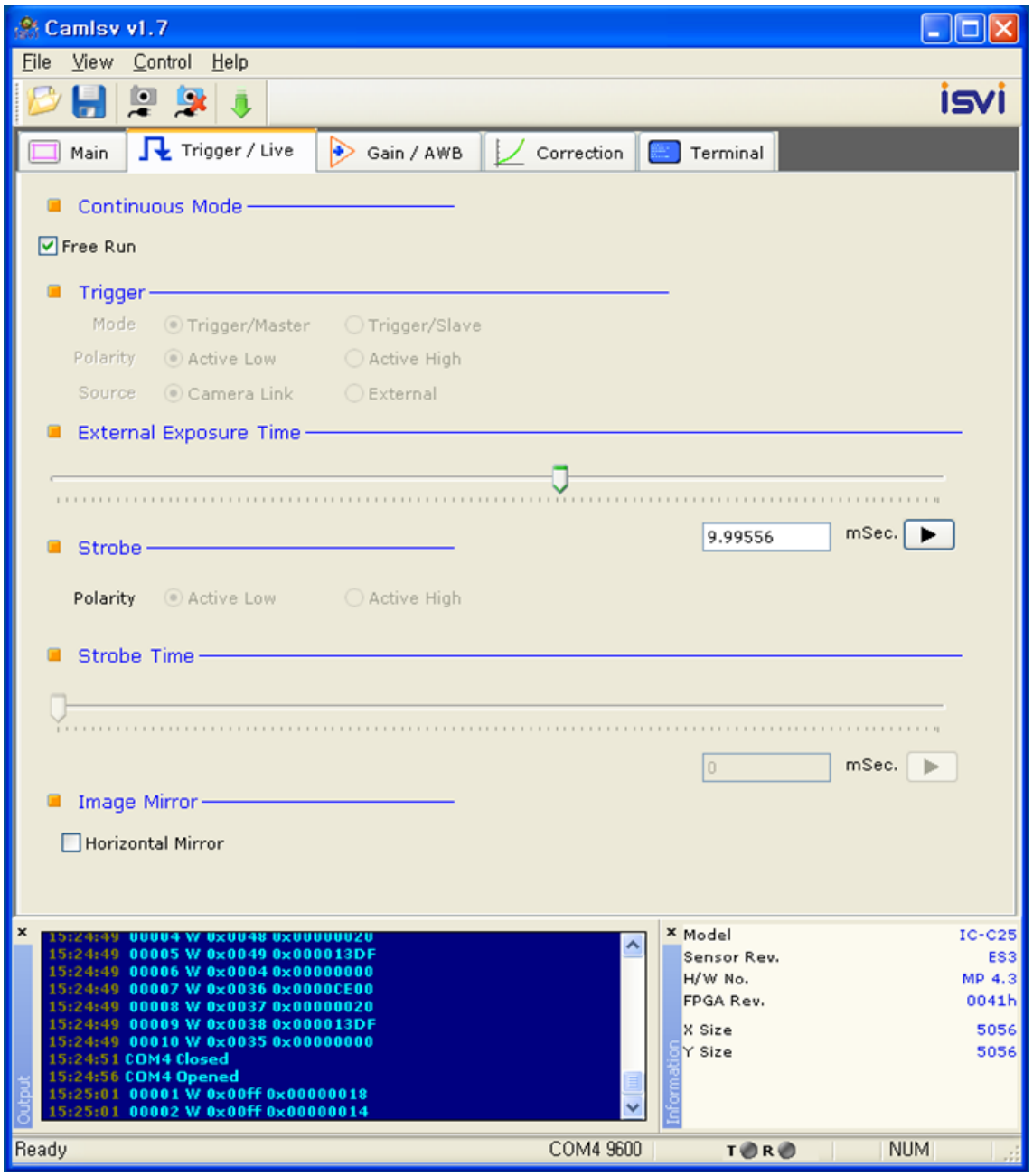


Fig. 8-6 Trig/live Windows

■ Continuous Mode

▶ Free Run : Regardless external trigger, it's output image based on designated exposure time.

■ Trigger

▶ Trigger/Master : It's output an image through designated exposure time by Source Trigger (Camera Link & External)

▶ Trigger/Slave : It's output an image through designated Trig Width by Source Trigger (Camera Link & External)

▶ Active low : It's for setting active mode in the Trigger

▶ Active High : It's for setting active mode in the Trigger

▶ Camera Link : The source setting of trigger to Camera link(CC1).

▶ External : The source setting of trigger Camera to External.

■ External Exposure Time

▶ It's for setting exposure time of Camera internal register. It's available to set from 1us to 10Sec

▶ It's able to use this function on the Mode of Free Run & Trigger / Master

■ Strobe

▶ Output strobe signal by Camera Exposure Time.

▶ It's available to use for light and shutter control

▶ Active low : It's for setting active mode in the Strobe Trigger

▶ Active High: It's for setting active mode in the Strobe Trigger

■ Strobe Time

▶ It's for setting strobe trigger time and it's available to set from 1us to 10sec

▶ It's able to use this function on the mode of Trigger / Master

■ Image Mirror-

▶ Horizontal Mirror : It's shown mirrored image and is changed Bayer.

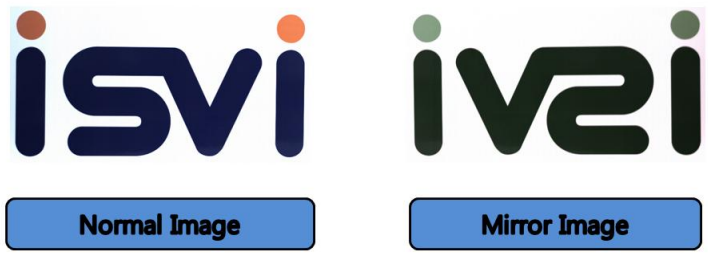


Fig. 8-7 Mirror Image

8.4 Gain/AWB Windows Control

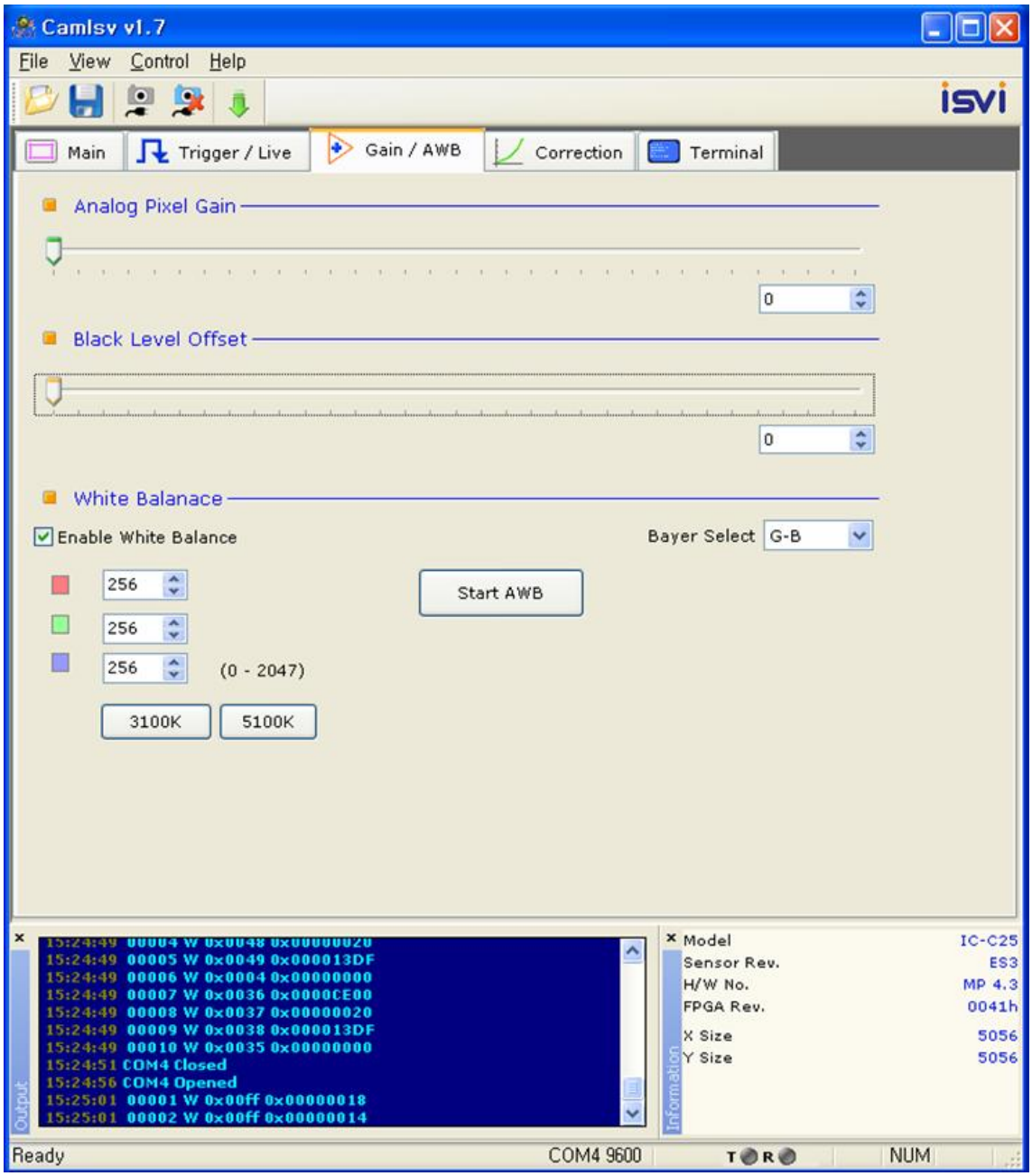


Fig. 8-8 Gain/AWB Windows

■ Analog Pixel Gain

▶ It's available to set Camera Gain Value from "0" to "255".

■ Black Level Offset

▶ It's available to set Camera Black Level Offset from "0" to 255

■ White Balance

▶ Enable White Balance : Enable White Balance function

▶ Bayer Select : Setting for Camera Bayer Pattern (R-G Select)

▶ Red : Set Red Gain Value by Manual [0~2047]

▶ Green : Set Green Gain Value by Manual [0~2047]

▶ Blue : Set Blue Gain Value by Manual [0~2047]

▶ Start AWB : Auto White Balance Start / The complete massage window comes up after 2~3 second.

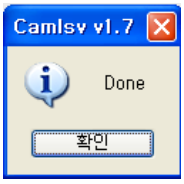


Fig. 8-9 AWB Complete messaage

▶ 3100K : Apply on 3100K of color temperature.

▶ 5100K : Apply on 5100K of color temperature.

8.5 Correction Windows Control

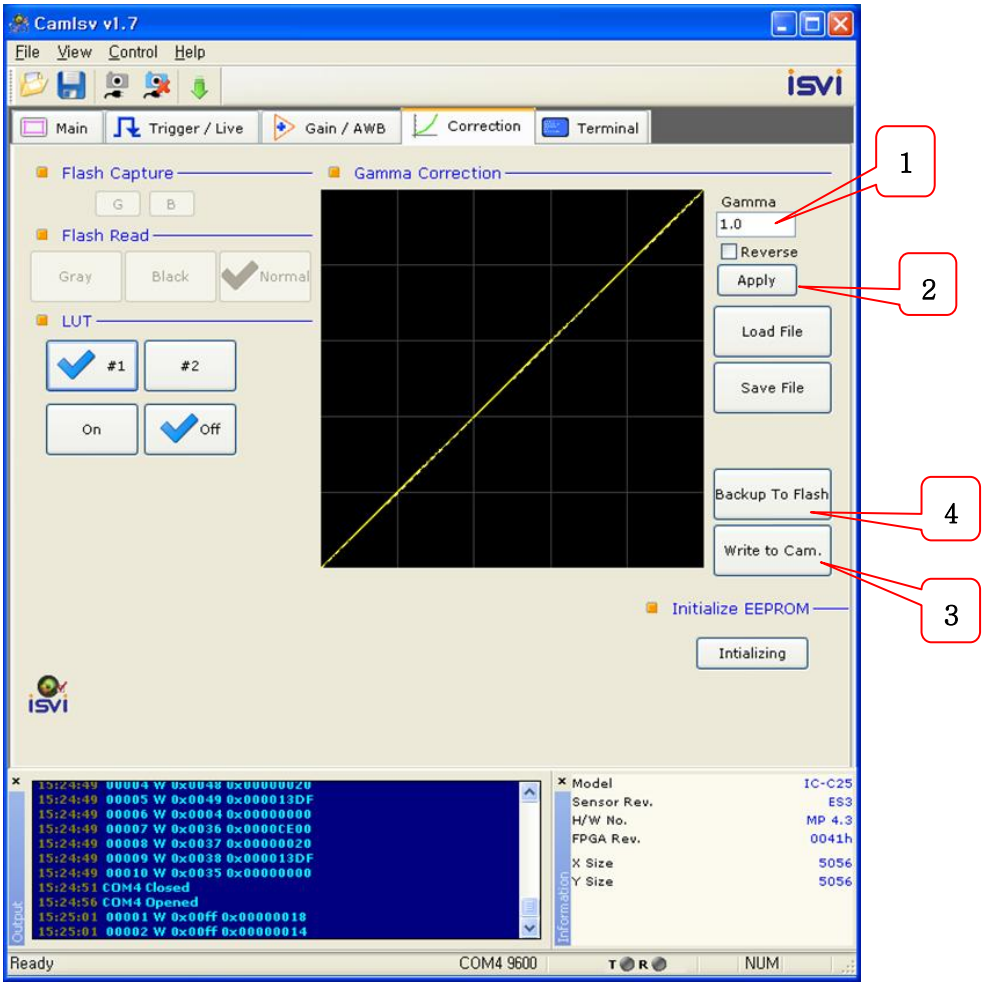


Fig. 8-10 Correction Windows

■ LUT

▶ Look Up Table : Set Gamma value considering the table

▶ Gamma : Set Gamma value (Available to save up to two)

■ Gamma Correction Download

1. gamma value setting
2. Apply button click
3. Write to cam. button click
4. Backup To Flash

■ Initialize EEPROM

▶ Intializing : Initialize setting value (memory reset)

8.6 Terminal Windows Control

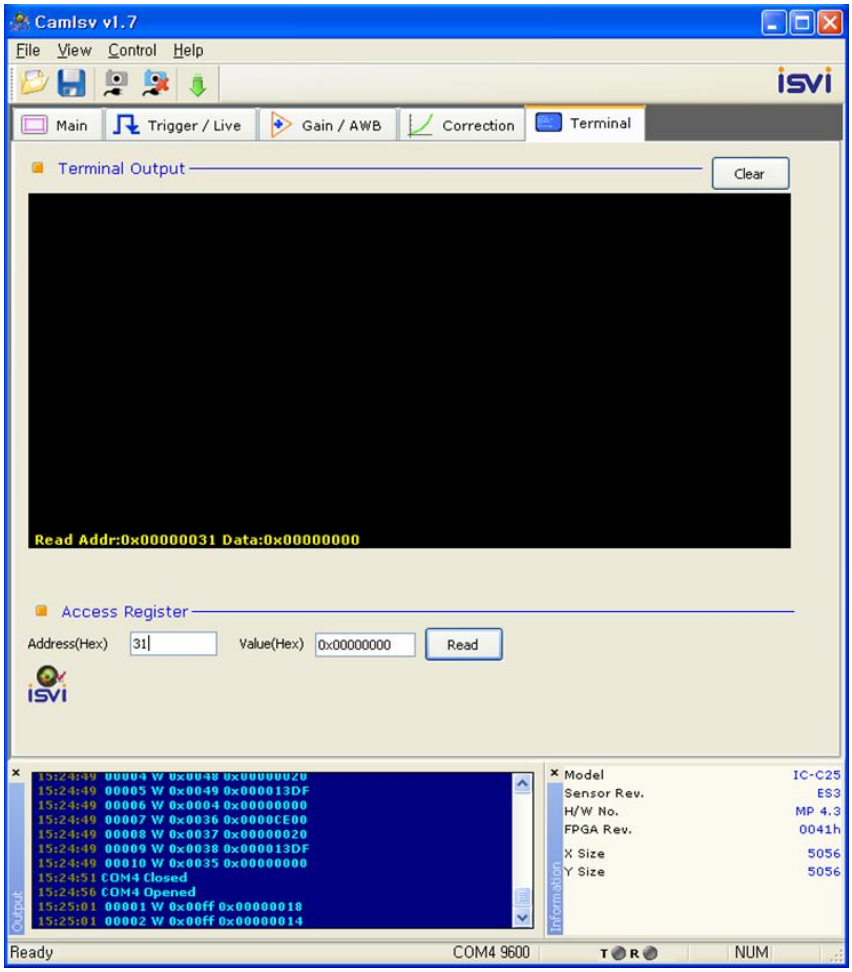


Fig. 8-11 Terminal Windows

■ Terminal Output

▶ Command code display terminal between PC to camera

▶Clear button : delete displayed command code on the screen.

■ Access Register

▶ Address(Hex) : Input or read address.

▶ ValueHex) : Input or read data value display.

CE

EN 55024 : 1998+A1:2001, +A2:2003
EN 55022 : 2006+A1:2007 [Class A Equipment]

FCC

Section 15.107, Section 15.109 (Class A Equipment)

NOTE : This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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